SUMMIT NOTES FROM STEVE HAMILTON

Kneebend to: JEFF.EVES, erickerney, pknoerr, bakersl, jrbernier, brownee, bucholtp, annemarie-chavez, patfenn, sue_glynn, hanshus1, jhegarty, bhinz, charles.ide, FTWRC, Shari Kolak, Richkoster2, jenlawton, Lisa_Williams, kricco, wawrzw, wesleyjk, Whtsds

12/13/2004 10:00 AM

Friends -

I am attaching Steve Hamilton's notes, slightly edited, from the Summit. Please let us know if you see any glaring mistakes or omissions.

Watch for more communications soon.

Rich

Kalamazoo River Watershed Council Dam Summit (8-9 Nov 2004)

Notes taken by Steve Hamilton. Spellings of names may not be correct.

Day 1 (8 Nov 2004)

Field tours: Three separate groups saw the Plainwell, Otsego (Twp), and Trowbridge dam sites. Boats were available at Plainwell (Scott Markham) and Trowbridge (Garrett). Group 1 was Steve Westenbroek, Will Wawrzyn, Jim Macbroom, and Dayle Harrison. Group 2 was Steve Hamilton, Bob Beck, Rita Jack, Sharon Baker, and Lisa Williams. Group 3 was Rich Koster, Linda Hickin, and Paul Knoerr.

Evening program (Fetzer Center, WMU):

Rich Koster's opening comments:

Elected officials present here recognized. Changes in participant list: Erin Haskin, DPW, Allegan here; Elizabeth Macklin, Ed Higuera, Bill Hinz not here

Materials in binder summarized

BioScience Aug 2002 special issue on dam removal

Facilitated Discussions are ongoing among major parties and this requires some prudence on our part. Those involved may not be able to say everything they might otherwise say because that could compromise the process. However, we can ask questions.

Evaluation forms to fill out.

Virtual conversation via email (or even a listserve if interest is sufficient) is planned to follow this Summit.

Printouts of presentations may be available.

Historical cases of dam failures listed.

Recent DEQ dam safety reports. Hazards to boaters remain serious.

Jim Hegarty (Prein and Newhof): [see Powerpoint presentation]

Big Rapids dam remnant removal 4 years ago. 1966 attempt at removal using explosives released large amounts of sand. Sedimentation was therefore a big fear.

Safety (drowning hazard) was main motivation of city to remove remnant; environmental concerns were also important motives.

Sediment was found to be clean.

Opposition came mainly from downstream residents who had experienced excess sand after 1966 demolition.

Ground penetrating radar used by USGS to profile sediments. Results showed that 30-90 thousand cubic yards of sediment might move. However, only 10 had to be moved by the end of the project (at a cost of ca. $450K).

Public meetings were useful.

Funding: Mich Habitat Improvement Fund committed but did not follow through. 5 other grants listed, totaling ca. $1.5 M.

Dam removal: Worked on dry emergent part of dam first, protected by sheet piles. Organic sediments found near dam and had to be dredged out so they did not get resuspended.

Ca. 8 thousand cubic yards; mostly sand and gravel plus organic material. Settling basins built (2 in sequence). Controlled drawdown achieved by gradually pounding sheet piling down. Sediment trap set up downstream at an existing rocky sill.

Soil uncovered *inside* old dam structure caused some unanticipated sediment transport that was readily visible as a plume.

Old RR trestle pilons and steel became exposed and caused unplanned costs for removal, plus more sediment destabilization. Also rock and timber cribs from logging era.

Stabilizing exposed sediment banks was needed. Mainly inorganic so easily stabilized with grass.

Controlled drawdown, plus sandy sediment in this site, combined to minimize sediment movement and thus costs and impact of project.

Riverwalk constructed afterward.

Future for dam removal: Funding is the big limitation.

Granholm letter: No response yet

HR 5190 dam rehab act introduced

Need a dedicated dam removal fund for the state. P&N is working with Public Sector Consultants to study potential.

Michigan River Partnership forming to publish report.

These dams are more than just the owner's/community's problem; they impact overall river and resources.

Jim MacBroom (Milone and MacBroom): Foundations

Fluvial hydraulics, morphology, ecosystem: Concepts introduced.

He has repaired more dams than he has removed – he's not necessarily a proponent of removal, unless they are functionally obsolete/unsafe/unstable. Many are still essential.

Aquatic habitat, fish passage often the motive to remove dams. Habitat fragmentation by dams increasingly seen as a problem. Also, improving water quality leads to greater recreational use.

Sometimes doing nothing is the best option. Or some degree of intervention rather than total removal.

He previewed tomorrow's presentations he will make.

Bob Schuchman and Sean Savage (Altarum):

Congr. Upton recognized for his support of this EPA-funded activity.

GLEAMS/Altarum web portal described using web site (www.greatlakesdecisionsupport.org). Began with a live demonstration this time (cf. meeting a few weeks ago for KRWC)

ALWAS buoy described; ex. of data (turbidity); water quality index

GIS mapping with internet map server (IMS).

PRP's sediment PCB data, WMU's PCB data available.

Risk assessment tool demonstrated (sediments, fish, human health) Equations from DEQ's baseline risk assessment and EPA's guidelines for human health.

Improvements planned in above. Metadata being added.

Water Quality Tool/Index demonstrated. Weighting of various variables shown.

Outreach & Education information demonstrated.

Want to add EPA's plans and proposals

Discussion Room, Event Calendar

Password-protected part ("sign-in") allows for restricted access to some parts (e.g.. provisional data not yet released to public).

Questions/comments:

Shari Kolak asked whether they had compared their results with comparable ones done by government agencies. Also, have they had EPA peer review? (A: no – just a recent "rollout"; an EPA outreach group has seen it. Their Science Advisory Group will soon look at it in more detail. Also, they will seek consensus on assumptions and calculations from all involved.)

Tennenbaum: "unitless" needs explanation.

??: Underlying assumptions about fish age?

Williams: "mg/L" as units for sediments? Need to specify whether it is wet wt or dry wt and why not mg/g?

Rita Jack: ALWAS continuously deployed? (no)

All data and calculations are documented on web page.

American Rivers video shown (since Maclin could not come)

Day 2 (9 Nov):

Rich Koster mentioned the forthcoming KRWC education campaign directed at Allegan County.

Steve Rheaume (USGS): Sediment studies by USGS

Rheaume, Rachol, Syed: team leaders at USGS

Studies requested by DNR and DEQ: Volume of potentially transportable sediments.

4 phases over 4 years.

Results comparable with prior work by consultants.

Sediment monitoring, discharge gauging, geomorphology, modeling (see reports).

EPA supporting continued gauge records.

Isco automatic suspended sediment samplers.

Big Rapids dam removal considered well done, even though USGS thinks more sediment moved than Hegarty estimates. Sandy sediments made it harder to delineate lower end of river bed – and thus sediment volumes – in that case.

Kalamazoo River is easier because original coarse sediments of river bed were covered by new finer sediments behind impoundments.

Consistent across all 3 dams was a "3 level system": sand filled in during first 50 years, then organic matter + clays from pollution sources (more rapid deposition), then after dams were lowered and pollution was reduced, lower deposition rates were apparent. Sand often deposited on top of organic +clay layer.

Sediment volumes, distribution maps for each site: Plainwell, Otsego City,

Otsego city dam impoundment got silted up in large flood after Plainwell Dam was decommissioned because it received sediments from upstream, and that generated braided channels.

Otsego dam: Pine Creek impoundment was flushed of sand during 1980's, adding 3 feet on top of organic layer.

Trowbridge dam: The biggest by far.

Geomorphic assessment: Report due soon.

Historical channel change (1827 land survey records plus aerial photos from 1938, 1960 and 2000). 1938, 1982, 1990's aerial photos shown. Large floods 1947, 1985. 1827 channel boundaries show system is returning to its historical channel configuration.

Kalamazoo River is very stable compared to other rivers.

When dams were lowered, sediments in upper part of channel behind dams moved towards dams.

Bank stability measured from Plainwell city to Otsego City Dam. Mass wasting and undercut banks are common. Diel river level fluctuations also cause erosion of banks. Examined most unstable areas to see if this gradual erosion was important to the overall sediment budget, but evidently it is not.

Catastrophic failure could be an issue but has not been observed on the Kalamazoo.

Clay from paper waste may stabilize the banks.

Sediment transport modeling (SEDMOD) from Bennett (2001). 1-dimensional. Can simulate multiple channels. Results indicated dynamic equilibrium for sediments behind dams below ca. 2000 cfs. Deposition and erosion vary with discharge. 1947 flood simulations (ca. 6000 cfs) show balance of inputs and outputs of sediments in spite of movement. Done without dams, immediate sediment movement is not that great, but erosion will gradually continue long after dam removals. Time for this is not well known.

If dams are removed and sediments are not, all of the sediment behind them has the potential to move. Lake Allegan would be the destination for most of it.

Jim MacBroom: Removal of small dams (case studies, modeling, geomorphology)

Dam removal issues include: Safety on site, catastrophic failure, water and economic use, sediment management, recreation, environmental impacts, design/construction

Siltation of downstream river is an issue for the Kalamazoo. Quantity important as well as quality.

Kalamazoo dams have aprons because they are not built on bedrock.

If such a dam were removed, its foundation is likely to stay in place (hard to remove).

Some recent removals have produced a lot of sediment movement. Some cases have not allowed fish passage due to hydraulic characteristics.

Channel headcutting and migration is a major concern for Kalamazoo, esp. if a major flood occurs before newly emergent floodplain is revegetated.

Headcutting demonstrated with diagrams. Begins at dam site and cuts out dam sediments in upriver direction. This can be more important that the "progressive" erosion (see later) described in the USGS presentation.

Anaconda Dam in Connecticut as an example. Removed 1999. Dam got breached in middle of study. Contaminated sediments.

Changes in channel width can occur and must be forecasted. Channel may return to the configuration expected based on geomorphic relationships (i.e., Leopold's work?). In Anaconda case, channel migration upon breach exposed an old sewer line, resulting in need for emergency dam removal.

At Anaconda, reach downstream of removed dam got smothered with sediments, temporarily.

Catastrophic dam failure can produce downstream channel scour that is also a concern.

Andranomous fishes a big issue in the Eastern US. Passage requirements of species of interest need to be evaluated because dam removal will not necessarily make it passable; dams were often built in reaches of steepest gradient.

Union City Dam (CT): Had contaminated sediments (PAHs). Vertically layered with thin layers of contaminants.

Riprap not used. Bleeds dissolved minerals, Better to use river bed rock.

Hydraulic issues: Changing climate can be important. Peak flow downstream may be increased after dam removal due to less floodwater storage and this can cause problems.

Modeling, which has a lot of uncertainty, has to be combined with a more qualitative analysis of morphology. Slope, discharge, sediment load most important.

On the Kalamazoo, may need to install some vortex weirs to prevent channel incision; he has used them on stream restoration projects.

Hoffman Dam in Chicago (Des Plaines River): Projected gradient would not alow fish passage, so had to reduce gradient as well.

West River: 2D model example. Interlinked grid cells. Roughness (to estimate resistance to flow). Dynamic simulation. Flow trace. Sediment transport included.

Bridges: For Kalamazoo, need more discussion. Scour of piers and abutments can be a problem after dams are removed.

Platts Mill Dam: Example where entire dam was not removed. Contaminated sediments precluded full removal. Part of dam served as a barrier to hold most contaminated sediments.

Kalamazoo has a low ratio of peak flow to mean annual flow compared to rivers he has worked on.

Edwards Dam (Kennebec River, ME): Earthen berm built above dam. Successful for restoration of fisheries, habitat.

Great Works Dam (ME): Ongoing work. Larger river. Active paper mill that requires water.

Veazie Dam (ME): Found little sediment behind dam, as in above case. This was expected based on modeling.

Cuddebackville Dam (NY): Removed for environmental reasons, esp. endangered mussel with populations fragmented by dam. Potential for increased siltation upon removal was a concern for the downstream mussels; boulder sills (weirs) were constructed to reduce sediment movement. Also, this was another case where fish passage had to be engineered.

Kalamazoo River would likely require similar boulder weirs, which help reduce movement of bedload sediments.

Chase Brass Dam: Some contaminated sediments were excavated beforehand. Channel had to be reconstructed. Relatively small scale.

Rocky Glen Dam: Upon removal they discovered a buried timber crib just upstream.

Baker Dam: Example of photo enhancements to illustrate how it might look after removal. Useful for public presentations.

Sediment issues: Kalamazoo case approached in unusual order.

Testing: have Kalamazoo River floodplain sediments been tested much?

Armor of pre-dam channel can be important. Dam construction may destabilize it, causing headcutting upstream.

Bristol Brass Dam: 2D model in 1D mode. Sediment flow vectors.

East Brass Mill Dam (CT): Example of a failure. Not removed enough, and too much riprap. Not passable to fish or boats.

Fish passage alternatives besides dam removal (normally preferred) include:

1) Trap and Haul (use din some western US rivers), roughened ramp (perhaps best for Kalamazoo case),
2) bypass channel (often done in Europe; long and gradual),
3) fish ladders (often do not work well in his experience; too species-specific),
4) rock-riffle fishway below dam to gradually surmount barrier;

Tingue Dam (CT): Bypass channel planned. Contaminated sediments have impeded removal so bypass channel is planned instead.

What is the vision for the Kalamazoo? Goals and objectives need to be clear.

Flow chart of sequence for dam removal: Kalamazoo is an alluvial channel. Drawdown test has already occurred with partial removal of dams. Hydraulic geometry (e.g., Rosgen work) often customized for region. Reference reaches can be useful. Kalamazoo case is a "complex project". 2D model may be needed but is expensive and inherently unstable (and thus not as robust).

He suspects Kalamazoo channel would be somewhat wider under natural flow regime. 1D model with variable width would be needed. Geomoprhic assessment of equilibrium width is critical because channel readjustment may cause greater erosion of floodplain sediments than anticipated.

Models must be calibrated and verified before proceeding with project.

Sediment Assessment Decision Tree: For contaminated sediments. In Kalamazoo case, we know sediments are contaminated and potentially bioavailable. Sediment removal is the obvious outcome (decision) if sediment is bioavailable; cap/isolate and/or partial removal may be options for less bioavailable sediment (i.e. floodplain).

[next presentation by MacBroom follows]

Steering Committee with representatives from all stakeholders is essential in a complex case like the Kalamazoo.

Dam removal fallacies:

1) All dams have sediments [behind them]
2) All impounded sediments will erode (much information on this topic from historical observations of dam failures; also natural lake drainage events (incl. glacial lake dams), postglacial changes in river flow, etc.)
3) Barren mud flast last forever
4) River dries up
5) Upstream channels headcut (often dominant mechanism)
6) Fish kills result (sometimes true)

Need to forecast river response and decide if it is acceptable or not, and whether natural response to dam removal should be modified by, for example, engineering interventions.

Type of deposit important (generally bottomset [lacustrine] in case of Kalamazoo dams). Topset vs. foreset deposits: glacial lake bed example. Reservoir deposits: delta, tapering, wedge, uniform (Kalamazoo tapering type?).

Sediment flushing: Gates at bottom of dams can serve this purpose until they get silted up.

Bushy Hill Dam, Community Lake Dam: Examples of catastrophic failures. Contaminated sediments in latter case.

Bunnels Pond Dam: Example of repaired dam. Channel reformed on lake bed upon drawdown. Raid revegetation.

South Batavia Dam (IL): Sampled during a flood flow. Fine sediment deposits found where velocity was < 1 ft/sec. Post-breach sediment behavior studied.

Lake Switzerland Dam (NY): Had been lowered as in Kalamazoo case. Try to avoid having a "wet breach". Riprap berms to contain sediments – not ideal design however.

Permitting often makes it hard to do dam removals properly – esp. timing.

Incised channel evolution model (Schumm et al. 1984): As channel incises below floodplain, velocity and thus erosive potential increase.

Progressive (based on shear stress thresholds) vs retrogressive (headcutting by plunge flow) bed erosion. USGS modeled progressive erosion?

Types of headcuts: Cohesive soil vs armored bed.

Knick (nick) points.

Kalamazoo may have cohesive clay sediments conducive to headcutting, once overlying coarse sediments are eroded progressively.

River channel slopes (Kalamazoo is gradual)

Lateral channel expansion: Response to changing slope. As river's planform becomes more level, meandering may increase. Could this happen on the Kalamazoo?

Bank stabilization: May be needed if channel becomes unstable.

Prediction of the upstream response to dam removal is a topic of ongoing research by Jim M. See his channel evolution model as a *flow chart*. Defined thalweg = ancestral channel. Perhaps not present in Kalamazoo case. Kalamazoo may have coarse sediments in channel. "C2 Wide" is likely case in Kalamazoo, so some channel degradation might be expected. Variable sinuosity, high width:depth ratio in Kalamazoo case. Sudden increase in slope may change channel form.

(In private discussion, he said he thought the USGS was underplaying the potential for lateral channel migration upon dam removal)

<u>Steve Westenbroek and Will Wawrzyn (USGS and WDNR</u>, respectively):

"Sediment issues and dam removal: North Avenue Dam case study" (Milwaukee River near its mouth)

Contaminated sediments were an issue here, but it was not a Superfund or state priority site.

A relatively large dam in an urban area (Milwaukee). 100-yr flood larger but mean annual flow lower than in Kalamazoo. 17 feet head largely infilled with sediments so water was very shallow in impoundment. Navigation canals were original purpose. Impoundment had recreational value and that was an impediment to its removal. Cooling water, combined sewer overflow discharges. Fish kills.

Drawdown by opening gates began in late 1990 (first time since 1970's). This was done because a bridge just upriver of the dam needed reconstruction (also a water main had to be repaired). While the impoundment was drawn down, the idea of dam removal was spawned and the drawdown was prolonged while this was studied (feasibility study cost $500K).

Rapid revegetation occurred.

Sediment management goals were focused on the contamination. Multiple contaminants to deal with, esp. PAHs and PCBs. Mud flats had higher concentrations than channel sediments and exceeded acceptable standards. An upriver impoundment had considerably higher concentrations of contaminants.

Baseline risk assessment for contaminants under various scenarios indicated that PCBs were the primary concern. Fish and waterfowl consumption posed by far the biggest risk for human health, cf. water or sediment contact or accidental ingestion. That in turn is linked to sediment exposure to flowing water.

A buried water main traversing the impoundment acted as a barrier that reduced the potential depth of downcutting in the impoundment, stabilizing sediments upriver of it.

Contaminated sediments: Management alternatives. 750K cubic yards of potentially mobile sediments.

Partial vs. complete removal vs. drawdown with gates vs. no action: Selected partial dam removal with dredging of channel only, plus engineered protection of mud flats. Spoils stored/capped at a nearby site.

Project cost \$5.7M. 5+ yrs. City, State, and federal sources.

[Will's part follows]

Sediment consolidation areas constructed within floodplain to handle the 6000 cubic yards of sediments. Too expensive to transport to landfill.

Coffer Dam to isolate estuary water (Lake Michigan nearby).

Low lake levels had to be considered. New lower dam platform was constructed.

Water bladders considered for channel blockage to allow access for construction, but decided on temporary bypass channel instead.

Articulated concrete matting (ACM) on top of geotextile had to be used to line new channel (cheapest alternative). (Actually it was not arranged to be articulated in this case, however.) This allowed revegetation by planting "livestakes" (tree cuttings) within the openings, which eventually obscured most of the ACM.

Some problems with ACM failure, geotextile leakage resulted in need to install gabions (rock-filled wire baskets) or gabion wire netting on top. Ice damage.

Benefits to fishes: Data shown. More diversity and more native species; fewer carp. Fish IBI. Eventual removal of barrier to passage was more important than the earlier drawdown. Models of habitat suitability to forecast changes were consistent with this.

Jay Wesley (MDNR): Kalamazoo River fishery and dam removals

Comprehensive assessment of Kalamazoo River fishery is forthcoming.

He has been involved in 3 dam removals already elsewhere.

Fish cannot pass any of the 3 dams under consideration in lower Kalamazoo. Habitat above dams is suboptimal for fish [species of interest].

Historical data on fisheries: Pre-dams

Archaeological sites dating back to 1600's (Cremin, Martin studies from WMU) show lake sturgeon, channel catfish, and freshwater drum were harvested.

Museum records and early reports show 89 species, of which he listed 14 that were in the lower Kalamazoo.

Gun Lake had significant population of Great Lakes Muskellunge prior to raised lake levels and loss of wetlands; may have a few left.

Migrations interrupted since Trowbridge Dam constructed in 1899, including lake sturgeon, freshwater drum. Sturgeons persecuted by fishermen as a nuisance.

1940s to 1970s: Pollution problems increased. Few fish reported in river.

Current data on fisheries:

Data are still quite limited. Rotenone data from 1984 (least selective method of evaluation) below Otsego showed mainly carp (195/acre), white sucker (127/acre). Other species much less abundant. Mainly lentic species.

Longitudinal gradient graph shows dams are in one of the higher gradient reaches of the lower Kalamazoo (4-6 ft/mile with subreaches up to 10-15). Pool/riffle potential if dams removed, as found in Marshall to Albion reach.

Diversity across system shows it is lowest (27 species) in lower Kalamazoo compared to upriver reaches (above Plainwell) and mouth (where more Lake Michigan species occur), presumably due to dams.

Future fishery projections:

Seelbach and Wiley et al. valley segment ecological classification: Landscape models.

Michigan River Inventory.

Linked to fishery by T. Zorn et al. (1998).

Valley segment classification (VSEC):

Ferren's surficial geology map useful to understand stream hydrology, temperature.

Channel confinement; glacial vs. alluvial classification. Lower Kalamazoo around dams is glacial and either sporadically confined or confined.

Land use map (agriculture, forest important to groundwater recharge, large woody debris inputs).

Stream temperature predictions show colder water in headwater reaches, warming before Kalamazoo, then cooling again below Morrow as groundwater inputs increase. Warms again below Lake Allegan.

Michigan River Inventory (MRI): Statewide map.

Combined MRI with VSEC to predict habitat distribution. Lake Sturgeon potential, for ex., indicates high potential for spawning from Trowbridge to Battle Creek. One of best among Lake Michigan tributaries. Lake Allegan passage is a challenge. Other species to benefit, assuming smaller dams removed, were listed, as 3 groups of species associations. More sport fish, less carp. Passage at Lake Allegan could bring more species, including potentially exotics (sea lamprey, for ex.).

Lake Sturgeon below Lake Allegan being studied; 5 adults caught at Saugutuck, ready to spawn. One larval sturgeon found as well.

Dayle Harrison: What about paper waste and fishery? Would removal impact fishery? Also, are predictions of angler-days for complete restoration available?

Steve Hamilton: Are the reservoirs barriers even if the dams could be passed by fishes? (perhaps not – experience at large impoundments on St. Joseph River with fish ladders)

Sharon Hanshue (MDNR Fisheries Habitat Management): Rationale for dam removal

[no powerpoint presentation used]

Dam safety reports from past summer indicate more rapid deterioration than thought. DEQ may order action. EPA also involved.

Plainwell Dam is in best condition, although most upriver. Priority may be based on worst dam conditions. Temporary fixes likely needed (again) – esp. at Trowbridge – while awaiting action from upriver to downriver.

Dam failure would not impact occupied structures much. Uncontrolled releases of PCBs are the main risk.

Steering committee or oversight group needed. Fundraising.

Benefits of dam removal: Restoration of natural flow regime, ecological processes, free passage of fishes, fluvial habitat, fisheries production, recreation, avoidance of dam maintenance costs.

She mentioned a cost of $500K per dam for removal. Rich asked how that would be covered. She mentioned funds possibly available from state for remediation of contaminated sediments. Could be capital outlay from legislature, or fish and game funds (may not be appropriate use).

Fish passage around dam does not improve upstream habitat, nor does it avoid dam maintenance costs.

Lake Sturgeon hardest to get by dams on their own, but could move them manually and use the Kalamazoo as a spawning area as is done in Wisconsin.

State dam re-licensing is one of her responsibilities.

Question by ??: What if state decided to remove dam but demand that PRPs remove the contaminated sediments? How could this scenario happen? And when is enough study enough?? (They are working closely with DEQ and PRPs and EPA on this to reach an agreement. Too much delay already. Plainwell is not necessarily the place to start.)

Rich Koster: What is status of conversation within DNR? (Director Humphries and her assistant director Mindy have been apprised of the issue. DNR has engaged with DEQ and PRPs to evaluate options. EPA mediation process is going on in parallel, although DNR was not recognized as a natural resource trustee and only recently added to the discussion group.)

Dayle Harrison: EPA should be on notice that there may be need for an emergency cleanup as was done at Bryant Mill Pond.

?? #1: Rick Karl is now Superfund Chief at EPA and the idea of emergency removal was discussed with him. (He formerly directed that program.) He said the cost and time factor into the decision to do an emergency removal, and the Kalamazoo River is beyond the cost/time limits. EPA's Skinner agreed.

Skinner: Plainwell is logical place to start for sediment removal.

?? #2: Confidentiality agreement for mediated discussions preclude discussion here. They may eventually make a public statement.

Dayle H: Superfund funding mechanism has yet to be renewed. If funds were there, emergency cleanup might be possible?

?? #1: Kalamazoo River has PRPs and that also makes emergency cleanup less likely.

Ken Kornheiser: Why not have more warning signs above dams? (vandalism, theft is a continuing problem) (Dayle: more now than ever)

Dayle Harrison (KRPA): Tourism and recreation potential of dam removal

Position statement on current status of modeling.

Report and film in the works on the Kalamazoo River lack-of-cleanup.

Allegan County and Kalamazoo County need to get together more on this problem. Form a roundtable of county and township officials?

Dam removal must be coupled with sediment removal to enhance tourism/recreation potential; riprap not attractive.

Riparian landowners might resist increased use of river by public.

Zoning changes may be needed.

Need to make river attractive to tourists from Chicago.

Smallmouth bass fishery: great potential. Formerly important (pre dams).

Perhaps $10-30M [per year] in lost economic potential.

PRPs' annual sales likely exceed 10s of billions, so costs of cleanup are not great for them. We are "being held hostage" by failure of polluters and EPA to enforce the law and effect a cleanup.

Increasing use of river by public is increasing public interest in the resource.

Jim MacBroom: Final Recommendations and Observations

River is in good condition for this region. Stable hydrology and baseflow avoids many problems with water quality and low flows that he has seen.

Dams obviously are in poor condition and would be difficult to repair. Replacement not an attractive option: No purpose, no funder.

Removal is optimum goal. Ramp is a "distant 2nd choice" that is better in other situations (e.g., for trout streams).

Downstream scour problems threaten structures.

River banks more stable than he expected. Less erosion than he often sees. But channel may still be widening and continued gradual erosion seems possible. Point bars not seen; they are a sign of mature channel evolution. Stable planform is a concern. Large meander at Trowbridge could cause an avulsion, steepening gradient and mobilizing sediments. Braided channel below Plainwell Dam is unusual; need to understand what caused it. If more braiding developed elsewhere upon dam removal, that could erode floodplain sediments.

Need a strong intergency + NGO steering committee.

Alternatives are likely to be specific for each dam; reports he saw take a one-size-fits-all approach. Should consider not only each dam but distinct river segments individually.

Extensive data but limited analysis of the data seems to be the case on the Kalamazoo. Need more holistic analysis.

Channel profiles, flow hydraulics, floodplain inundation data are fundamental, but where are the data available?

USGS geomorphology report (forthcoming): sinuosity, channel pattern, width"depth ratio, floodplain aspect ratio should be addressed.

Erosion inventory points: Important to inventory. If both banks are eroding simultaneously it may indicate widening (cf. normal channel migration).

Monitoring bank recession rates would be valuable.

Bridge, utility crossings are important to consider. Annual inspections of bridge piers done by state agencies (MDOT): A source of data.

Infrastructure that might emerge upon dam removal: Must be evaluated. Can be costly, even dangerous.

Plainwell impoundment: Low floodplain aspect ratio. Channel often close to valley wall. Thin band of contaminated sediments could be removed easily, so streambank could be cleaned up.

Floodplains: Could consider bioengineering approach (use of planted vegetation). Could help deter channel avulsions in future.

Headcutting is a concern. Progressive erosion more likely to be retained in sand layer. Need better understanding.

He will write a memo of these points.